Dummy sensor test

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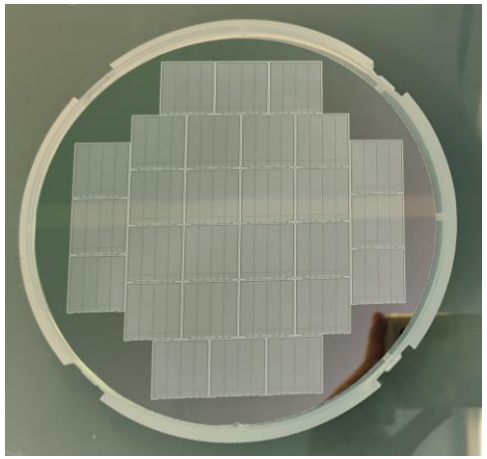
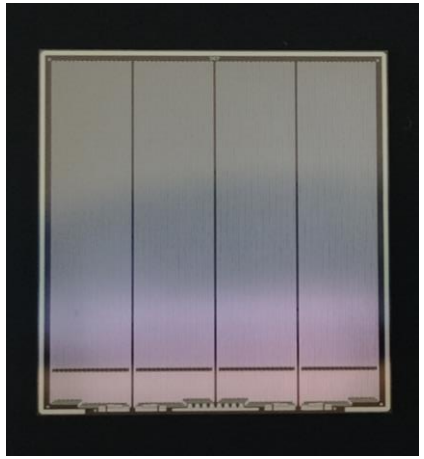
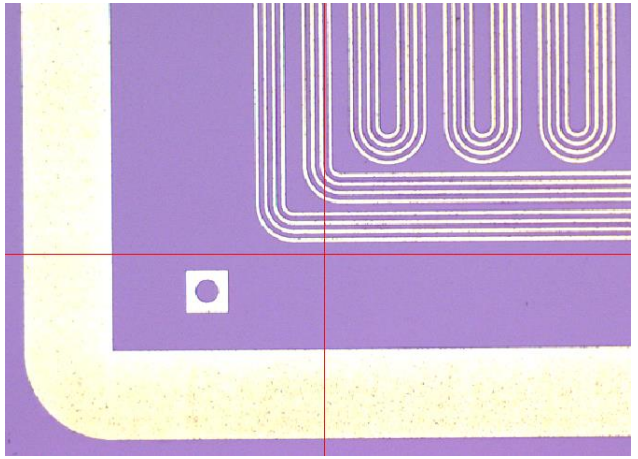
Motivation

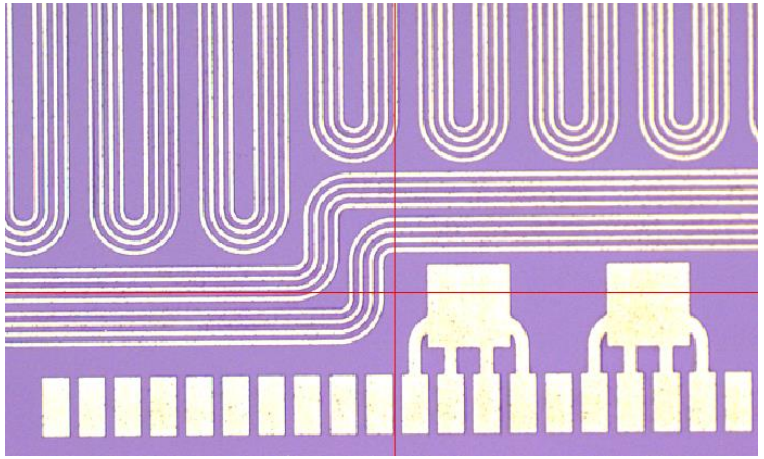
- Chip: Dummy COFFEE v2
- Motivation:
  - Pre research on heat dissipation and mechanical properties for CEPC and LHCb prototype.
  - Approach real chips as closely as possible in terms of size, material and heat generation.





8 chips × 28 sensors = 224 sensors





Yield rate: ~80 % observed under microscope

Test result

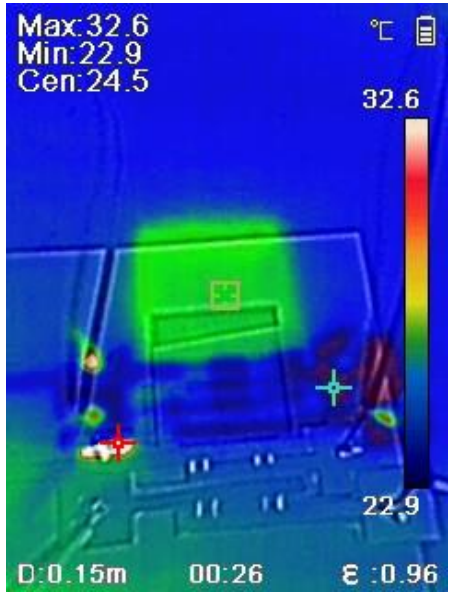
Dummy sensor								
	Design				Test			
	¼ Sensor	Sensor	¼ digital	digital	¼ Sensor	Sensor	¼ digital	digital
Power	540-1080 mW		61.69 mW					
Power density	150-300 mW/cm²		150 mW/cm²					
Resistance	231 Ω	4 in parallel 57.75 Ω	22.2 Ω	4 in parallel 5.55 Ω	215Ω	4 in parallel 53.75 Ω	23.2Ω	4 in parallel 5.8 Ω

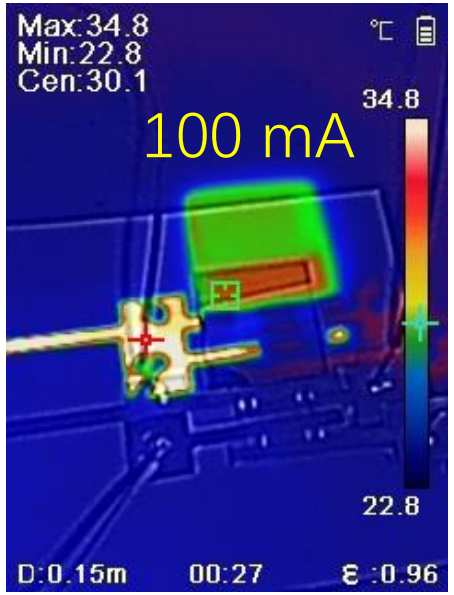
Sensor 1			
Current [mA]	Voltage [V]	Power [mW]	Temperature [°C]
100	5.06	506	30.1
110	5.72	629.2	31
120	6.33	759.6	32.7
130	6.92	899.6	34.6
140	7.63	1068.2	37.8
150	7.97	1195.5	39.7

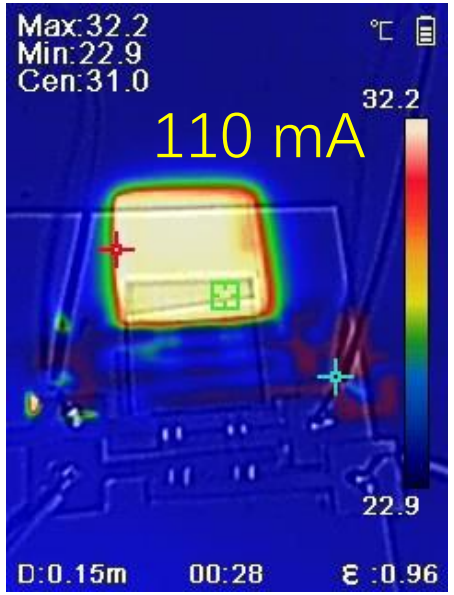
Digital			
Current [mA]	Voltage [V]	Power [mW]	Temperature [°C]
100	0.58	58	

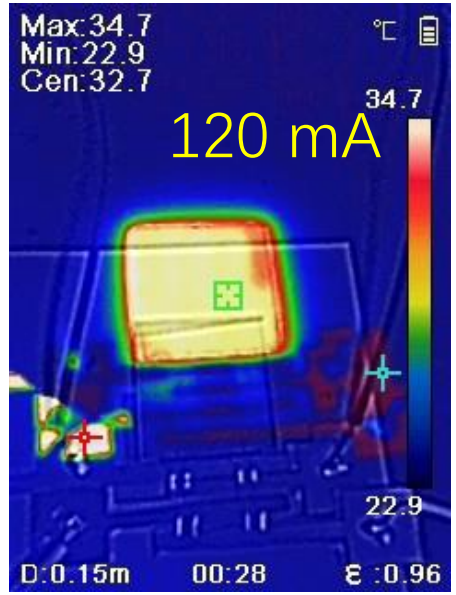
Sensor 2			
Current [mA]	Voltage [V]	Power [mW]	Temperature [°C]
100	5.87	587	
110	6.51	716	
120	7.09	850	
130	7.82	1016	
140	8.59	1190	
150			

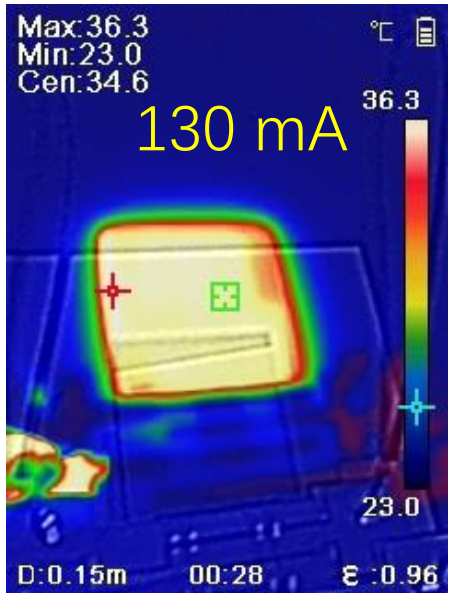
Test pictures

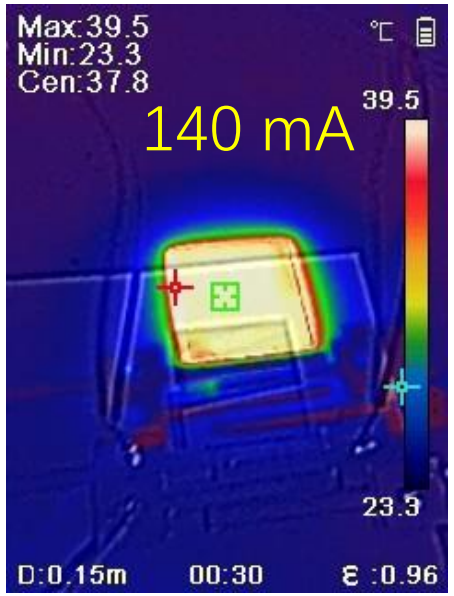


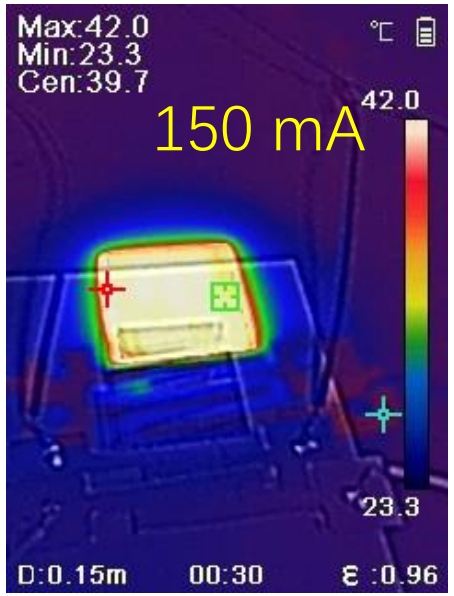


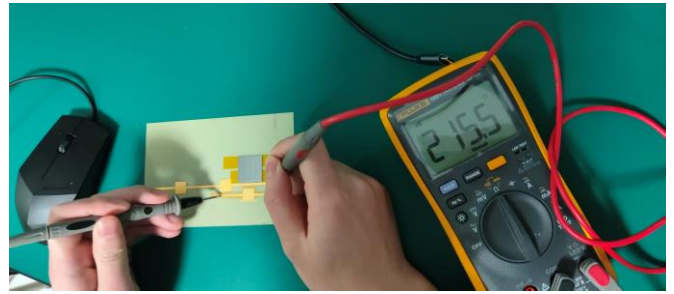




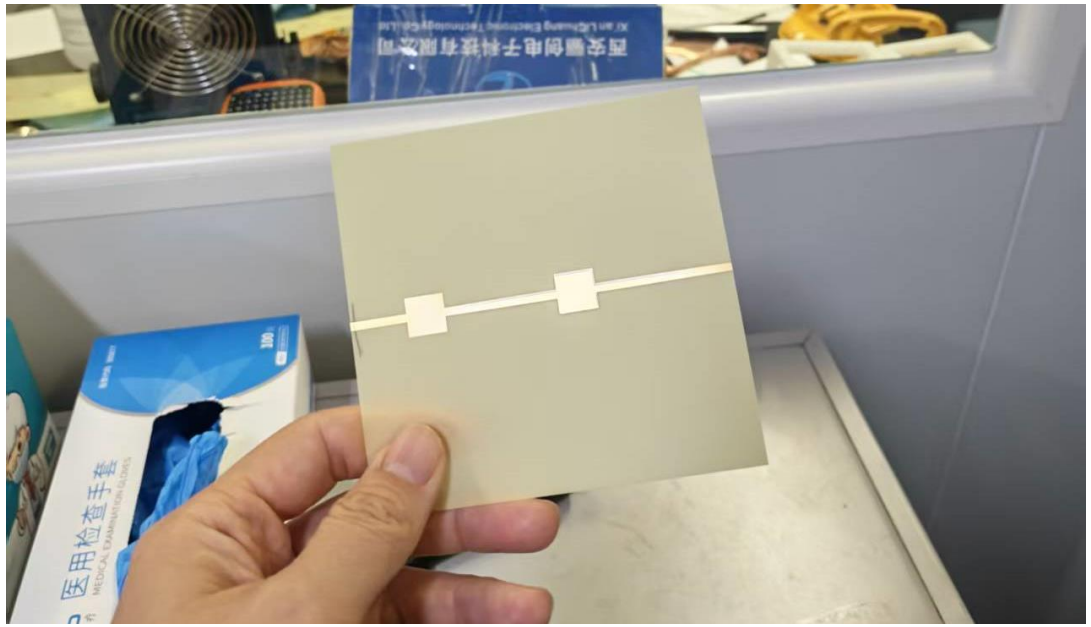








To do list



At present, it is only a rough test. Should we make circuit boards (High Tg FR4 material) based on the number of chip stickers in the future?